# COVID-19 Spread

> ⚠️ I'm not an epidemiologist, doctor, or any kind of expert on the subject so take this with a grain of salt.

One of the key messages from today's PM announcement is that things will get worse before they get better. I wanted to have a sense of the rate at which COVID-19 is spreading in Canada, so I made a graph, and did some math.

First, I got the data from https://www.covid-19canada.com, plotted them on a graph, and tried to use a basic exponential model to extract some key information.
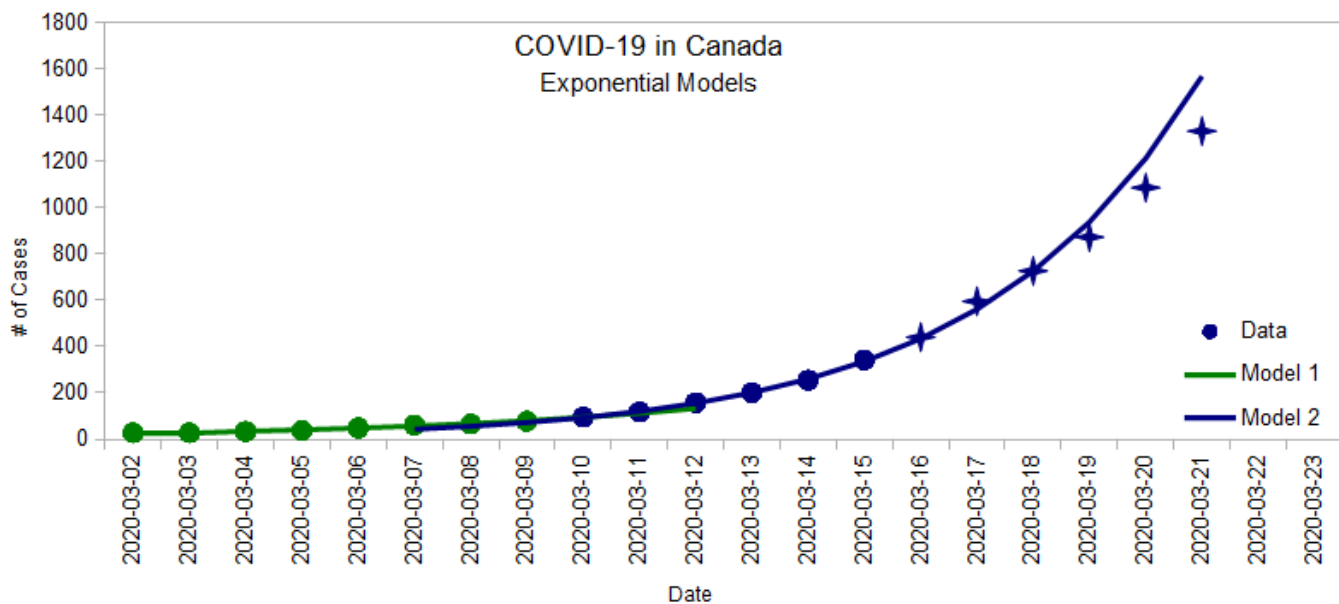
| Date	Count
2020-03-02	27
2020-03-03	27
2020-03-04	33
2020-03-05	37
2020-03-06	48
2020-03-07	60
2020-03-08	64
2020-03-09	77
2020-03-10	95
2020-03-11	117
2020-03-12	157
2020-03-13	201
2020-03-14	254
2020-03-15	342

There seems two different patterns in this two-week period:

- Between March 2 and March 10 (ish) (green line), the number of cases was **doubling every 4.1 days**.
- Between March 10 (ish) and now (blue line), the number of cases has been **doubling every 2.7 days**.

The formulae for the exponential curves are:

- $24.5 \times 2^{(\frac{t}{4.1})}$ for the green line (where t is the number of days since March 2)
- $93.1 \times 2^{(\frac{t}{2.7})}$ for the blue line (where t is the number of days since March 10)

If the blue pattern continues until the end of the week, we should have close to 1600 cases by the end of Saturday[1]:
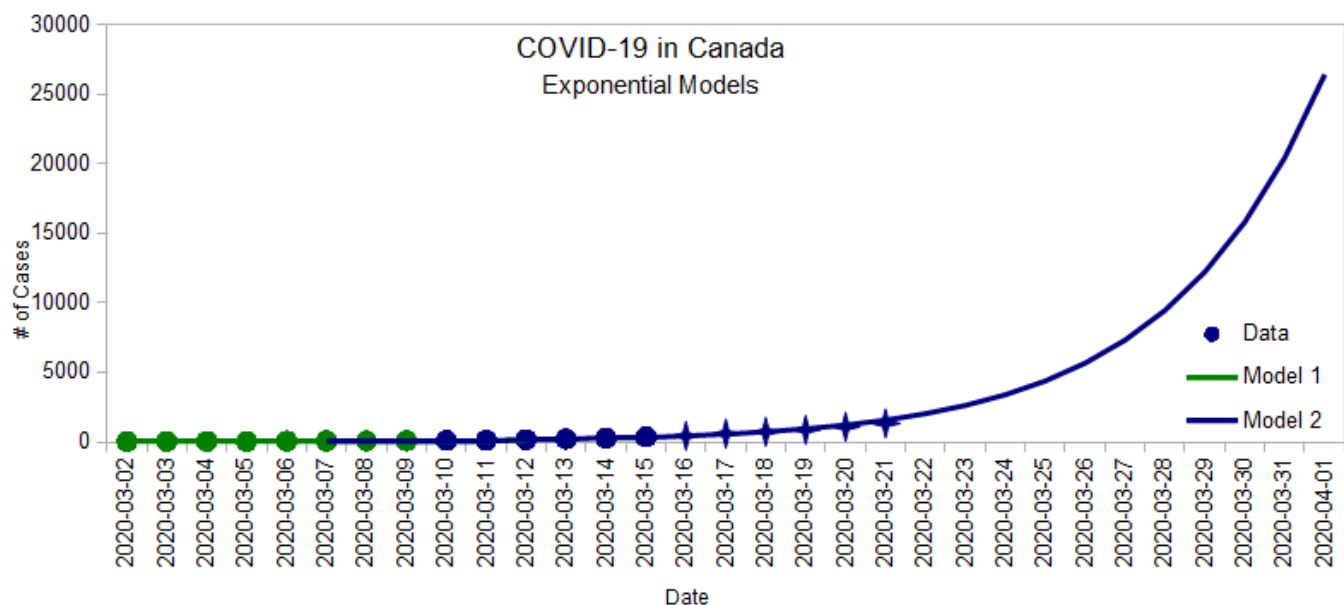
In reality, the spread of the infection follows a curve like the ⬛ Logistic Function. The beginning looks like an exponential, but the end flattens out, which is what the news keeps referring to when they say that social distancing and proper hygiene helps "flattening the curve" more quickly.
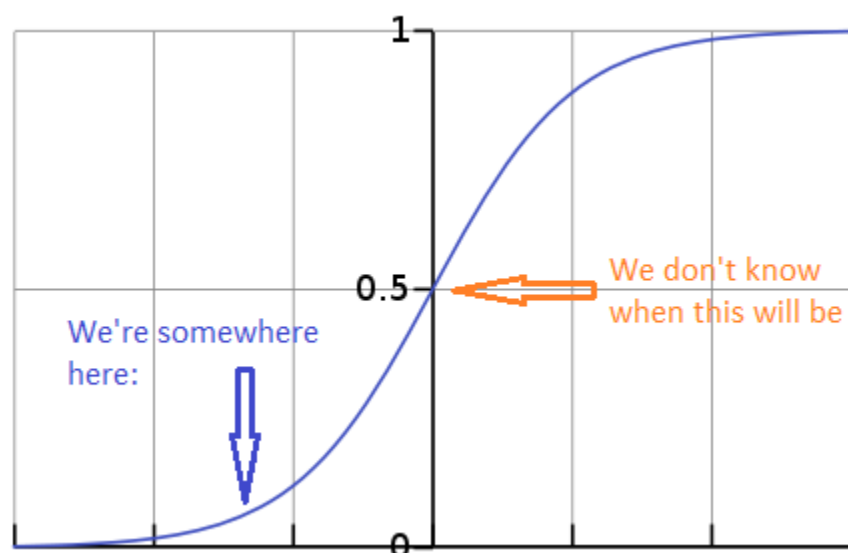
Here's a good video that explains this sort of math and why being able to think in exponential term is important for non-linear systems such as this one.
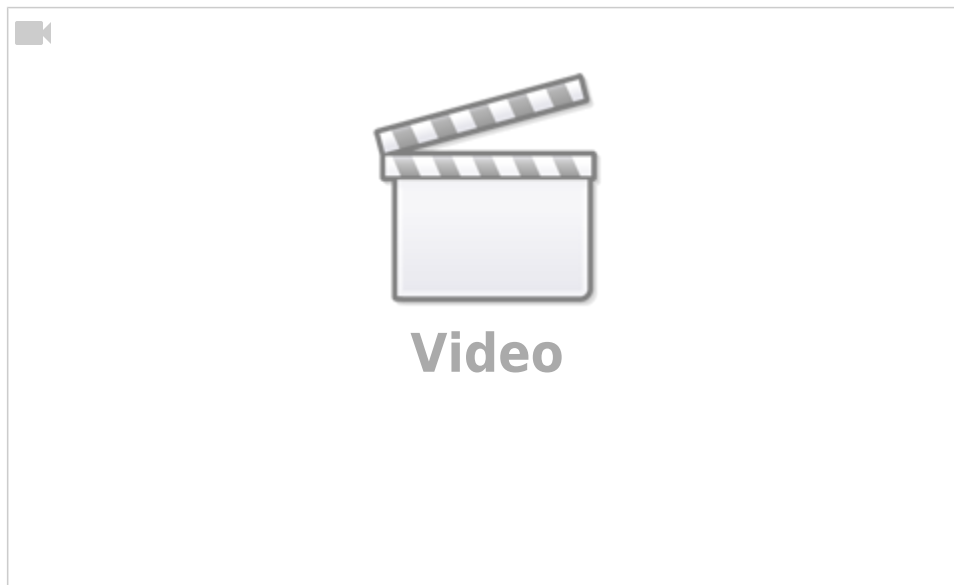
If you like this sort of thing, I did something similar in 2011 about the atmospheric CO_2 levels, and then updated the data seven years later to see how my model stacked up.

[1)]

I'll update this post every few days to see how the model holds up.